



Northeastern Florida Bay Minimum Flow & Level Update

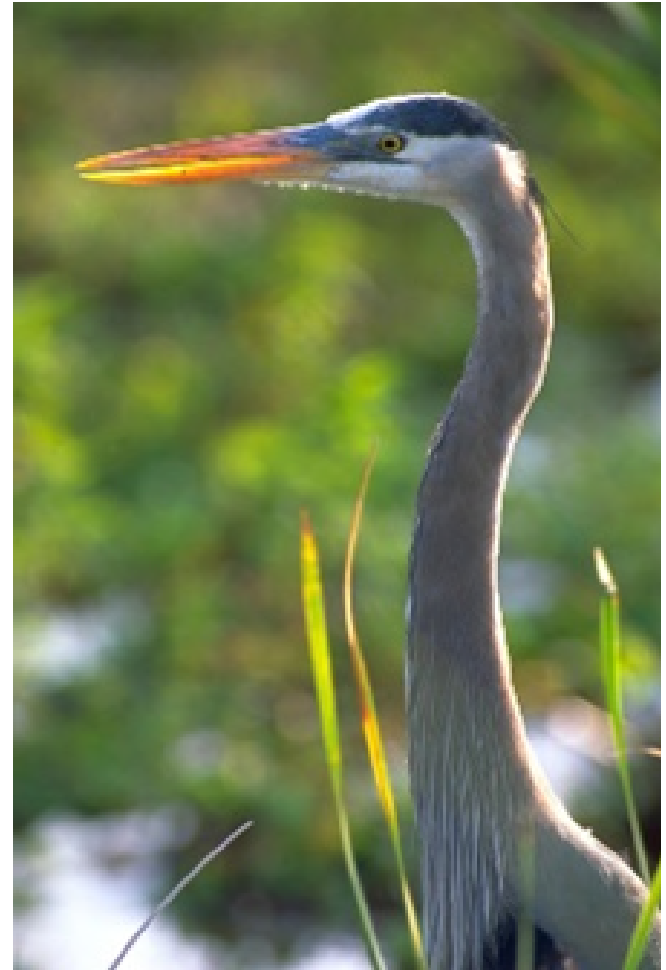
Water Resources Advisory Commission

May 5, 2016

Terrie Bates
Water Resources Division

Water Resource Protection Tools

- WRAC requested refresher on the various Chapter 373 tools used for the protection of water for the environment
- Overview and update on the Minimum Flow and Level (MFL) established for Florida Bay

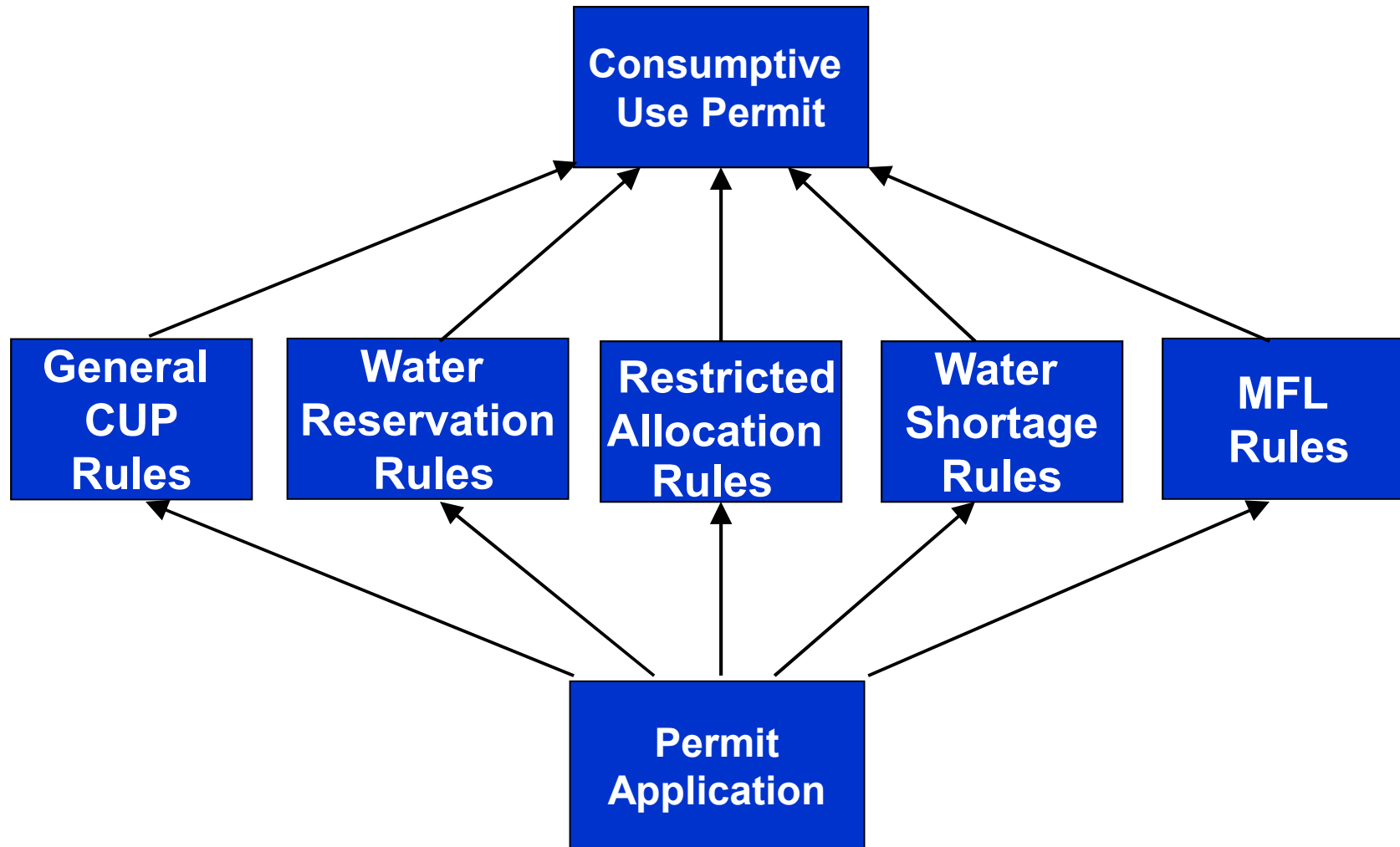


Great Blue Heron

Water Resource Protection & CERP

- WRDA 2000 requires that water for the natural system be identified in CERP Project Implementation Reports (PIR) and protected
- Chapter 373 requires each PIR to identify the increase in water supplies resulting from the project component and specifies that the additional water supply be allocated or reserved by the District
- Protection of water for the natural system required in order to for the District to enter into a Project Partnership Agreement (PPA) with the federal government and receive its 50% cost share for CERP project

Water Resource Protection Tools are Integral Part of Consumptive Use Permits

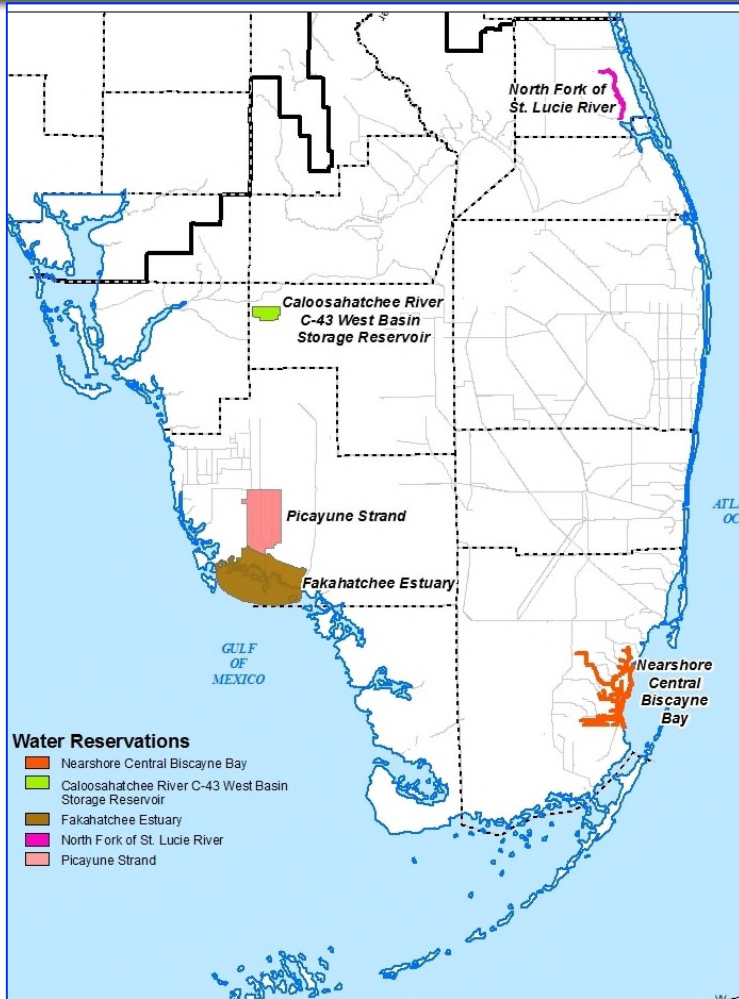


Water Reservation Rules

- Sets aside water from consumptive uses for the protection of fish and wildlife or for public health and safety (373.223(4), F.S.)
 - Based on scientifically defensible determination of water needed for protection of fish and wildlife
 - Reserves water from allocation to consumptive uses
 - Accepted tool for protection of environmental water associated with CERP projects



Existing Water Reservations



- Picayune Strand
- Fakahatchee Estuary
- North Fork of the St. Lucie River
- Nearshore Central Biscayne Bay
- Caloosahatchee River C-43 West Basin Storage Reservoir
- *In Progress - Kissimmee River Watershed*

Reservations cover 343,674 acres

Restricted Allocation Rules

a/k/a "Regional Water Availability Rule"

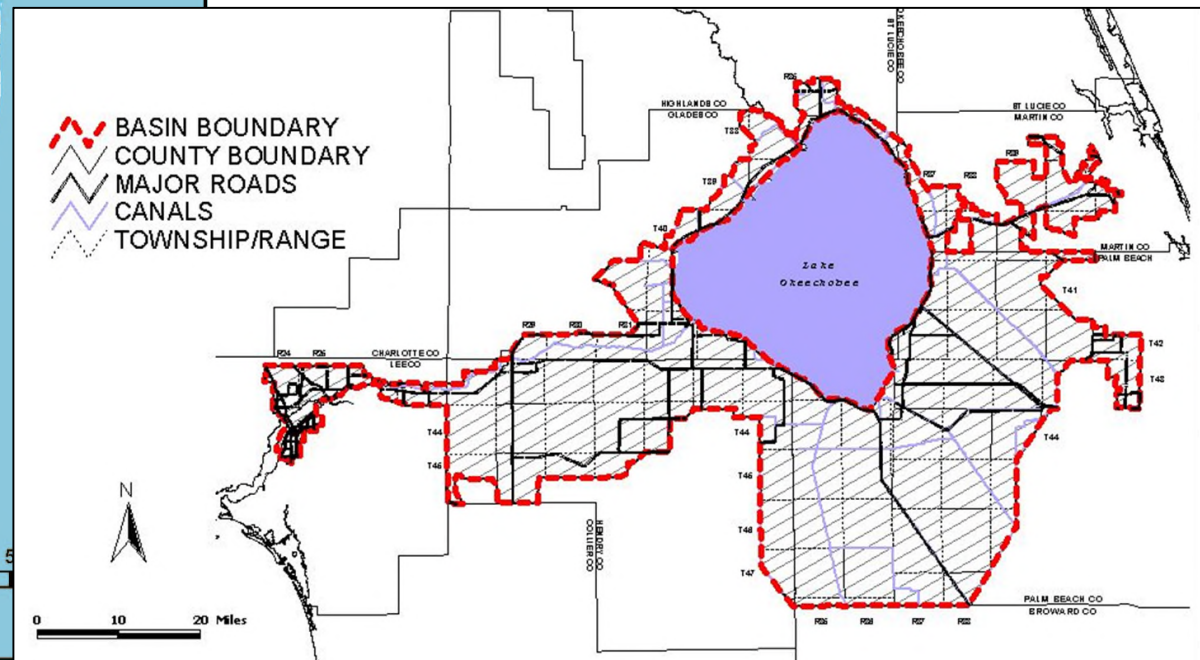
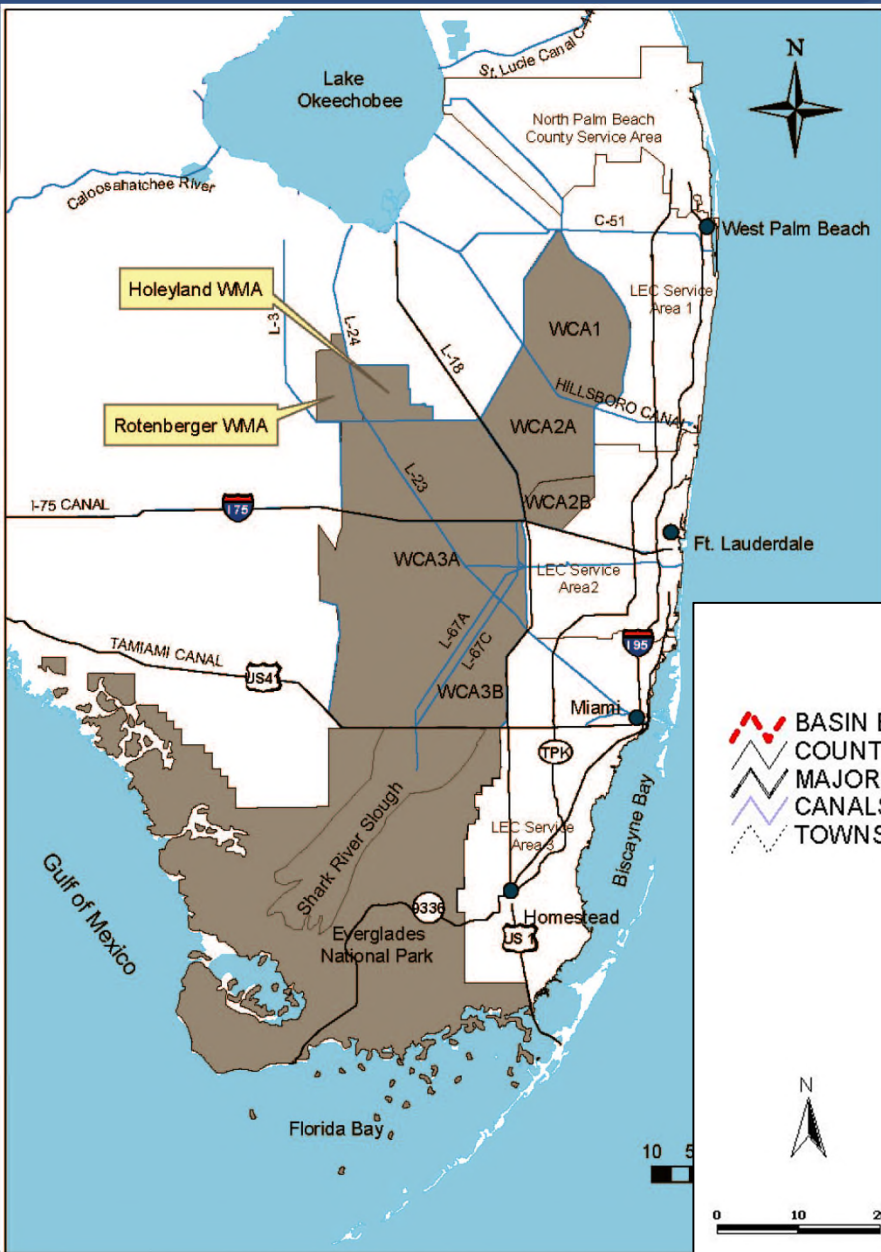
- Applicable to large geographic areas covering multiple ecosystems
- Restricts withdrawals near identified waterbodies (Everglades, Lake Okeechobee etc.) and integrated conveyance systems
- Governing Board public interest considerations drives determination
- Rules also protect future water made available for the natural system by CERP projects
 - Governing Board must certify water is available from CERP projects for other water supply needs



WCA 3

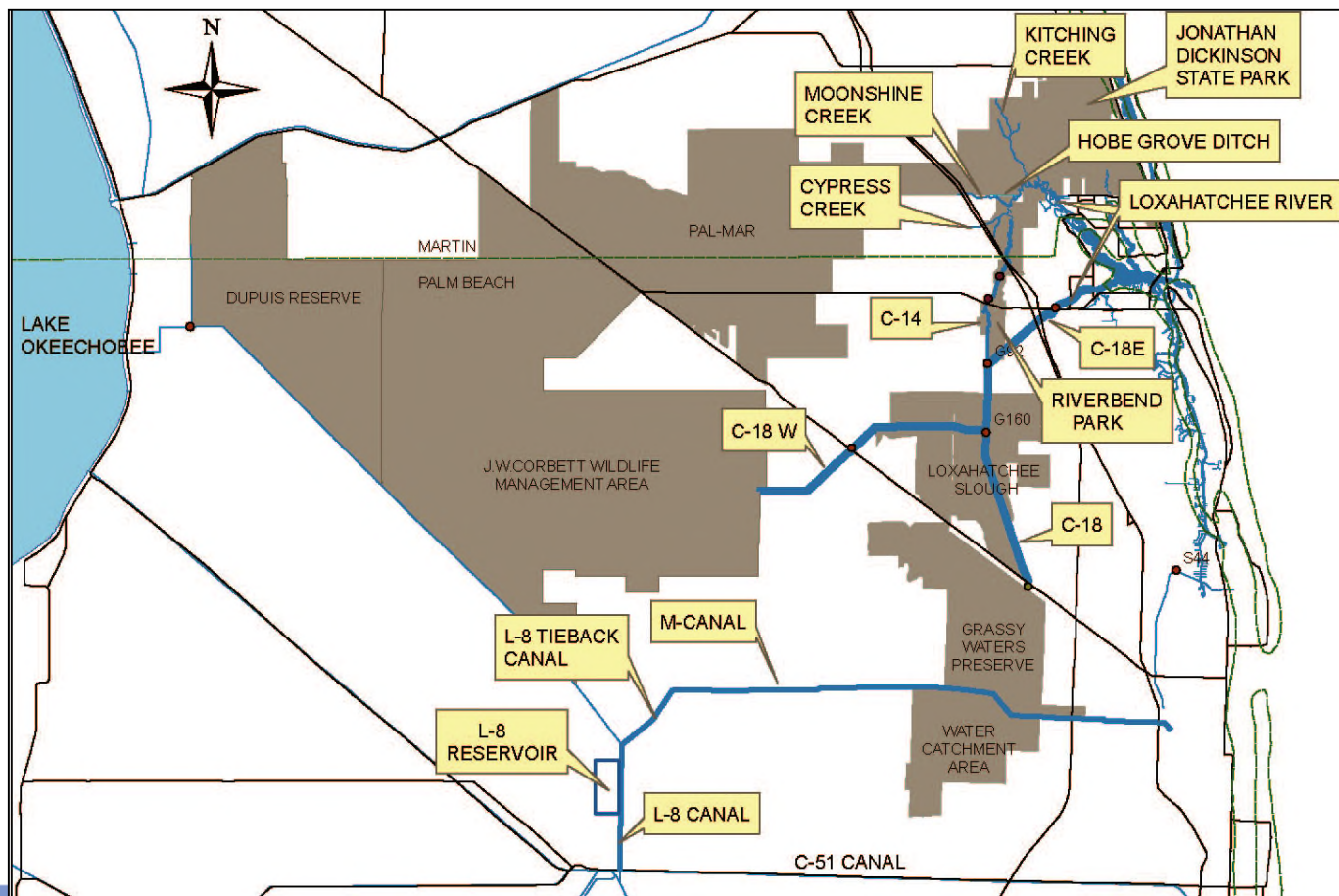
Restricted Allocation Rules

- Lower East Coast waterbodies and major integrated conveyance canals
- Lake Okeechobee Service Area



Restricted Allocation Rules

North Palm Beach County and Loxahatchee River watershed waterbodies and major integrated conveyance canals



Water Shortage Rules



PHASE II: SEVERE

**Mandatory
Water Restrictions
Are in Effect**

For Information
1-800-662-8876



- Consumptive use permits issued based on a 1-in-10 year level of certainty
- CUP limits set well above the MFL significant harm standard
- Water users subject to declared water shortages and mandatory cutbacks in usage during drought events

Water Resource Protection Standards		Observed Conditions
Water levels/flow decreasing	Permittable Water NO HARM Reservation of Water (1-in-10 level of certainty)	Normal Permitted Operations Environmental Restoration
	Phase I Water Shortage Phase II Water Shortage HARM	Temporary loss of water resource functions taking 1 to 2 years to recover
Drought severity increasing	MINIMUM FLOWS & LEVELS	
	Phase III Water Shortage SIGNIFICANT HARM	Water resource functions require multiple years to recover
	Phase IV Water Shortage SERIOUS HARM	Permanent or irreversible loss of water resource functions

Palm Beach County -2007

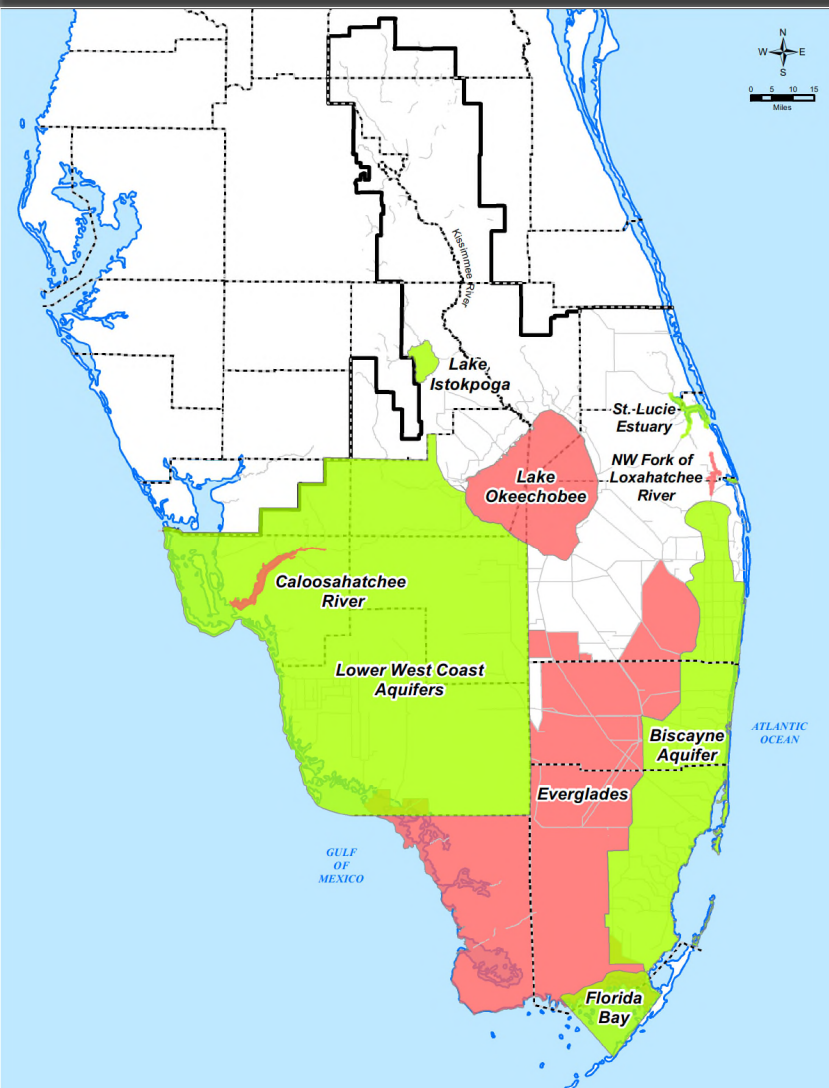
Minimum Flows and Levels



Loxahatchee River

- Required by statute to establish MFLs for waterbodies based on annual Priority List
- Identify the point at which further *withdrawals* cause significant harm to the water resources of the area
- MFLs are set at the “significant harm” level:
 - Temporary loss of functions caused from a change in surface or ground water hydrology that takes more than 2 years to recover
- Peer reviewed science
- Prevention or recovery strategy adopted concurrently with MFL and updated through water supply plans

Existing MFL Waterbodies



■ MFL Prevention Waterbodies

- Biscayne aquifer
- Lower West Coast aquifers
- St Lucie Estuary
- Lake Istokpoga
- Northeastern Florida Bay

■ MFL Recovery Waterbodies

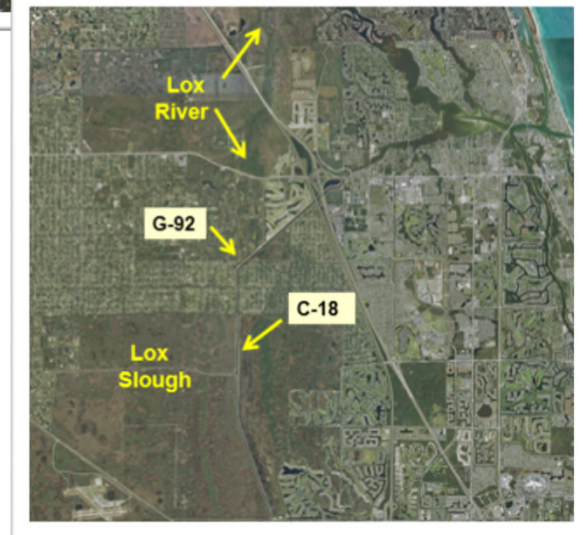
- Lake Okeechobee
- Everglades
- Caloosahatchee River
- NW Fork of Loxahatchee River

MFL Prevention or Recovery Strategies

- Strategies developed and updated in concert with the water supply planning process
- 20-year period planning horizon
- ***Prevention Strategy*** for those that are meeting the MFL but not expected to meet it in 20 years
 - Prevent the existing flow or level from falling below the established minimum flow or level
- ***Recovery Strategy*** for those not meeting the MFL at the time of adoption
 - Achieve recovery to the established minimum flow or level as soon as practicable

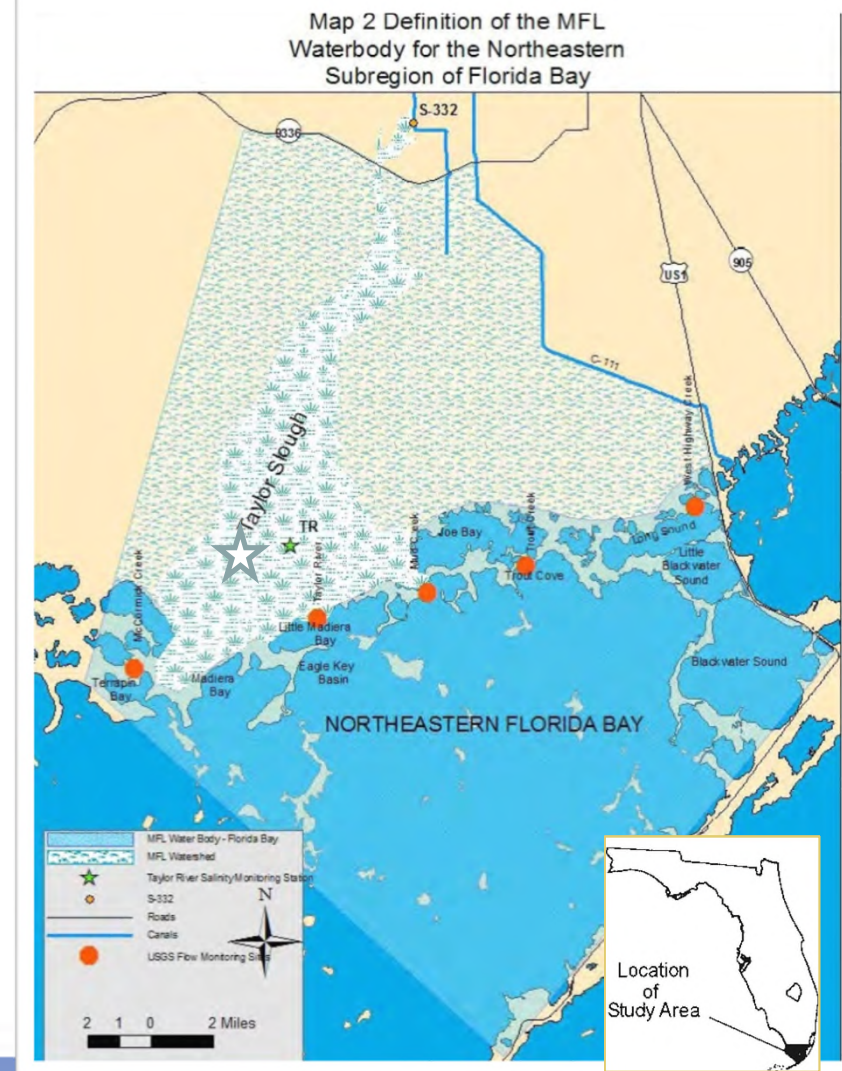
Relationship to Water Management Operations

- Resource protection rules do not control or govern our water management operations
- However, water managers actively manage system with consideration to all mission elements – flood protection, water supply and environmental objectives
- No “drought-proofing” - exceedances or violations anticipated during drought



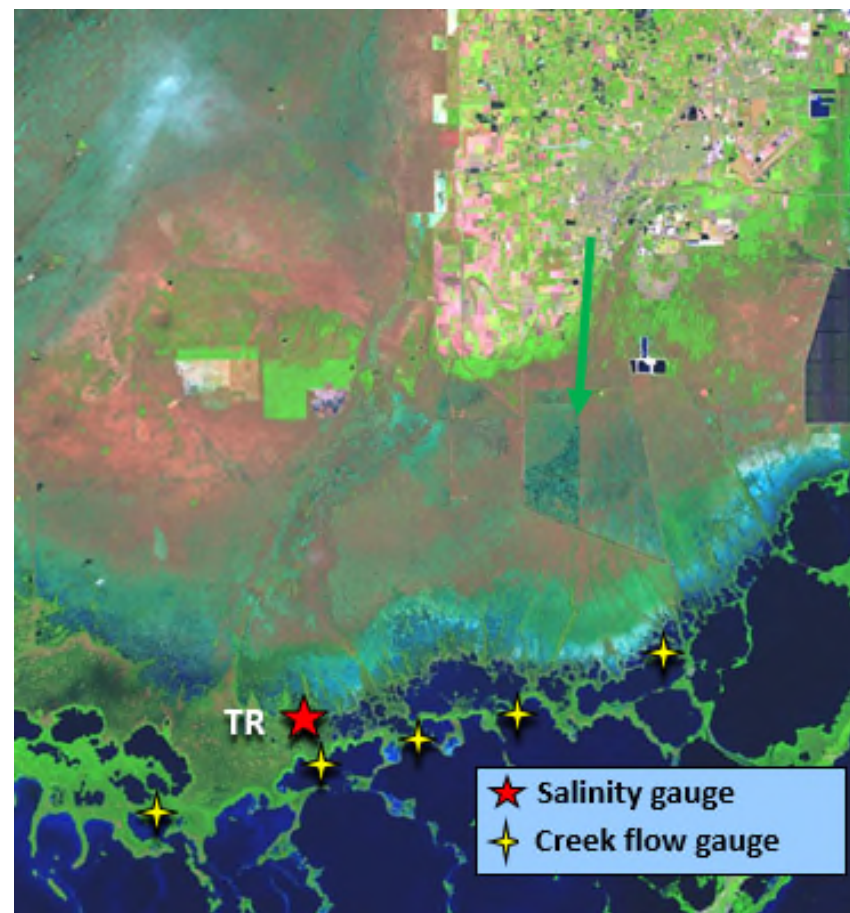
Northeastern Florida Bay MFL

- MFL for Northeastern Florida Bay was adopted Dec. 2006
 - Salinity-habitat relationship
 - Modeled assessment of flow-salinity relationship
 - Independent scientific peer review
 - Periodic review of MFL required by rule



Northeastern Florida Bay MFL Criteria

- Minimum flow component:
 - Net discharge into Bay of 105,000 acre-feet of water over a 365 day period
- Duration component:
 - An “exceedance” occurs when the 30-day running average salinity exceeds 30 psu
- Return frequency component
 - A “violation” occurs when an exceedance occurs during each of two consecutive years, more often than once in a ten-year period



MFL Monitoring Locations

Northeastern Florida Bay MFL Prevention Strategies

- *Prevention Strategy* adopted concurrent with MFL
 - Modifications to operations for improved management of freshwater discharges to the headwaters of Taylor Slough and southeast Everglades should consider the MFL in coordination with:
 - Modified Water Delivery project & C-111 Canal project
 - CERP C-111 Spreader Canal Project
 - Expanded monitoring & research
 - Updated Lower East Coast Water Supply Plan
 - Review of MFL criteria after 5 years

Changes Since MFL Adopted in 2006

- Expanded monitoring implemented
- Water Resource Development Projects
 - C-111 Western Spreader Canal
 - Tamiami Trail One Mile Bridge
- Everglades Restoration Transition Plan (ERTP) operations implemented
- LEC 2013 Regional Water Supply Plan



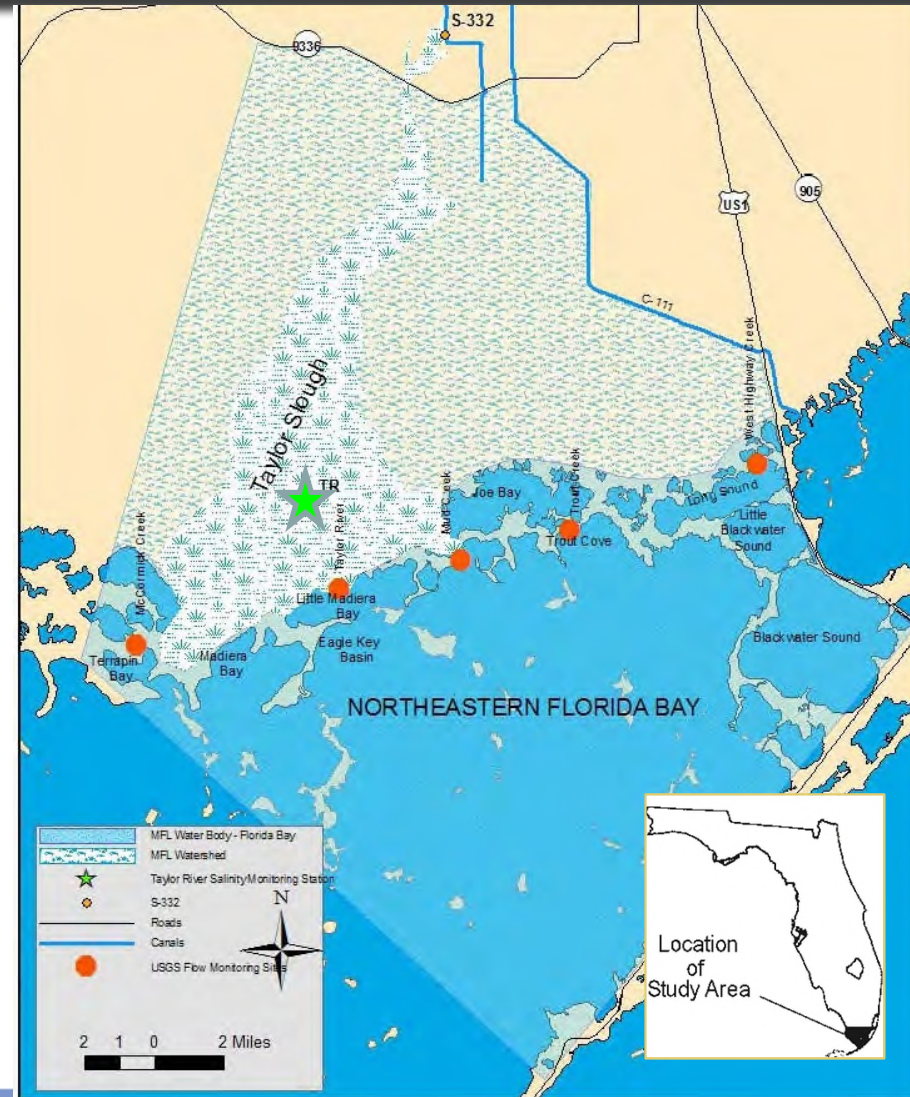
S-199 & Aerojet Road Canal



Aerojet Canal Plugs

Evaluation of MFL

- Technical re-evaluation of Florida Bay data and MFL occurred from 2012-2014
- Presented to WRAC in January 2014
- MFL Technical Report completed and submitted to FDEP in June 2014

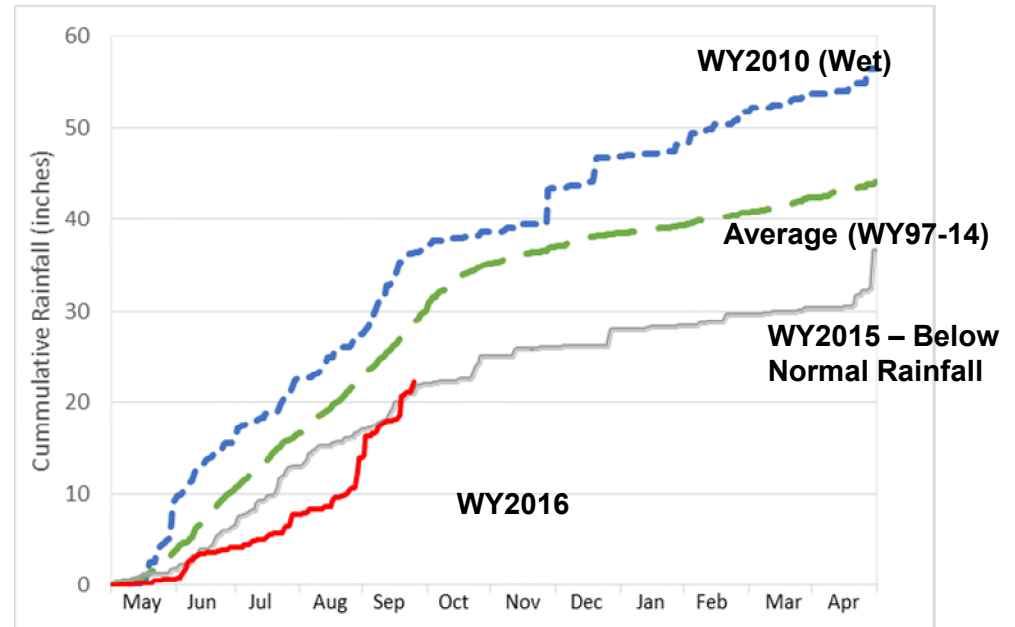
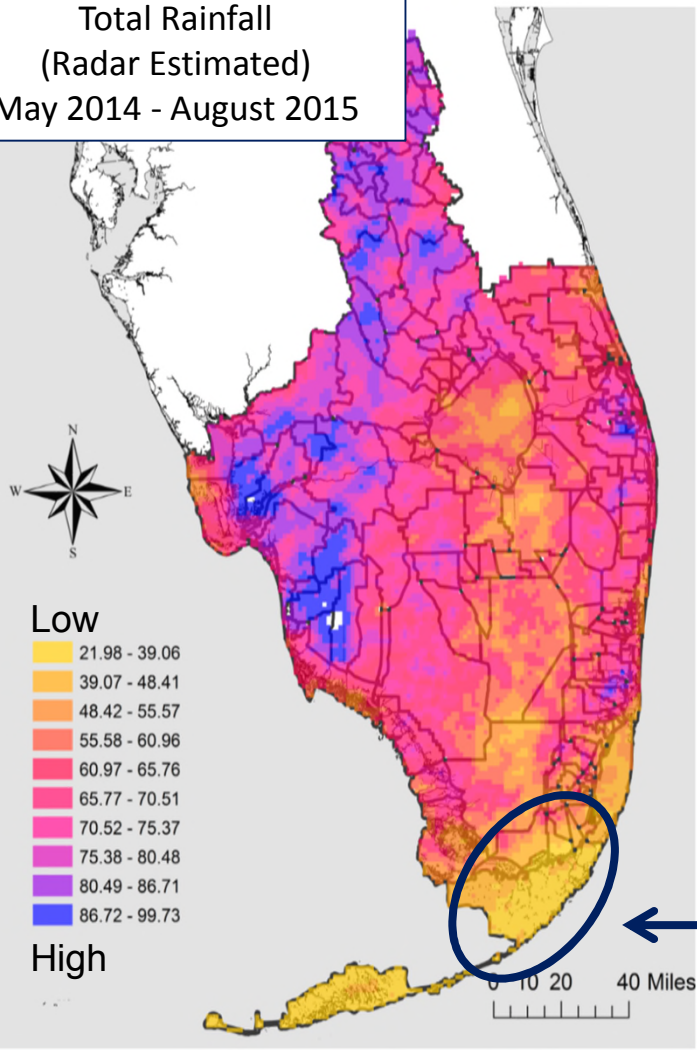


Conclusions from Technical Review

- No revisions to existing rule criteria are warranted at this time
 - Flow & salinity criteria are reliable indicators for significant harm
 - No violations expected in the future
- Elements of the existing prevention strategy plan should be periodically updated with the LEC water supply plan
- Continue rule specified monitoring and research
- Continue to review MFL periodically when significant changes occur with full implementation of Modified Water Deliveries and Central Everglades Planning Project
- Review serves as a good baseline for future regional improvements (CERP projects)

District Rainfall Distribution WY15 & early WY16

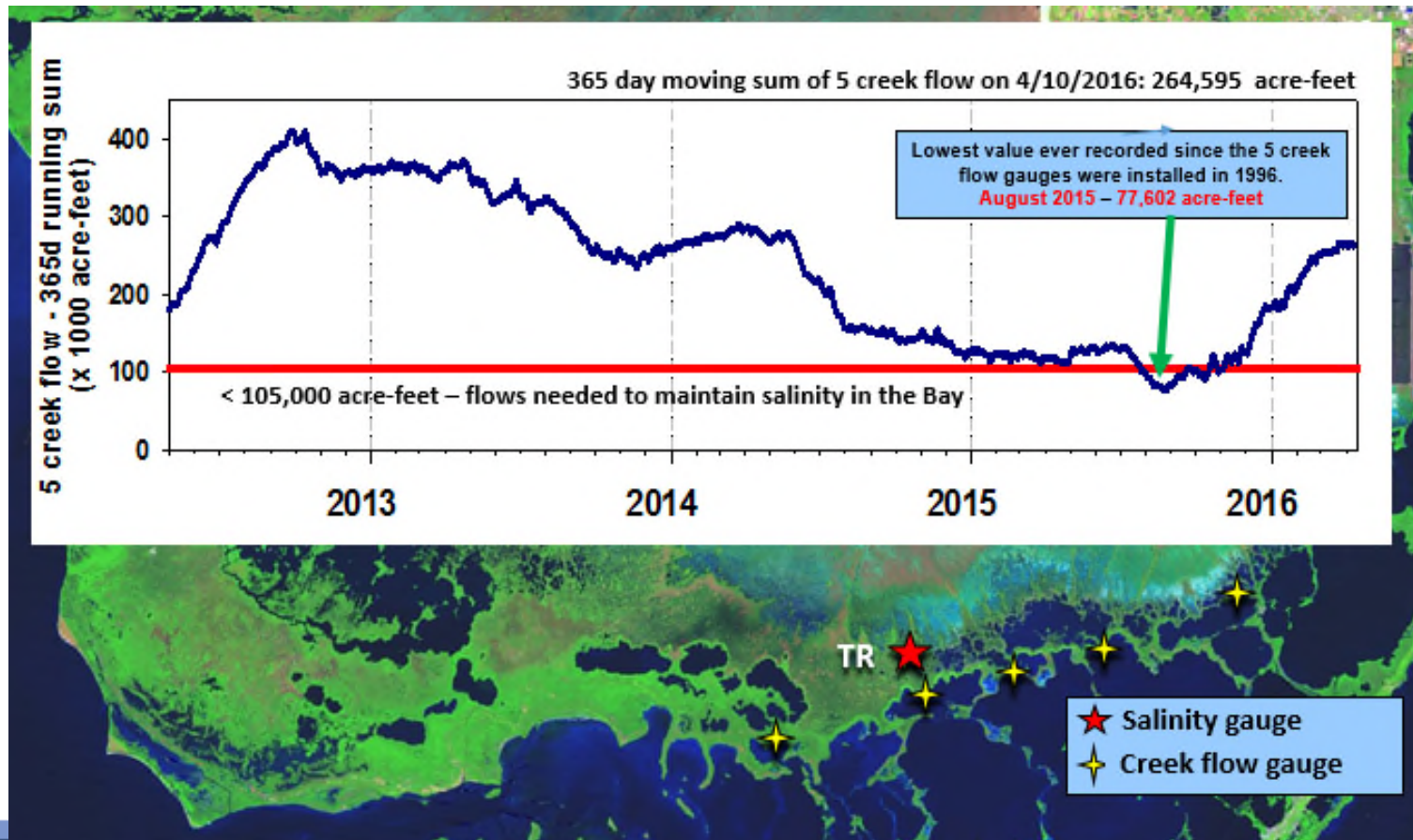
Total Rainfall
(Radar Estimated)
May 2014 - August 2015



- Taylor Slough & Florida Bay received the lowest amounts of rainfall
- 25-35 inches compared to 50-60 inches (wet year)

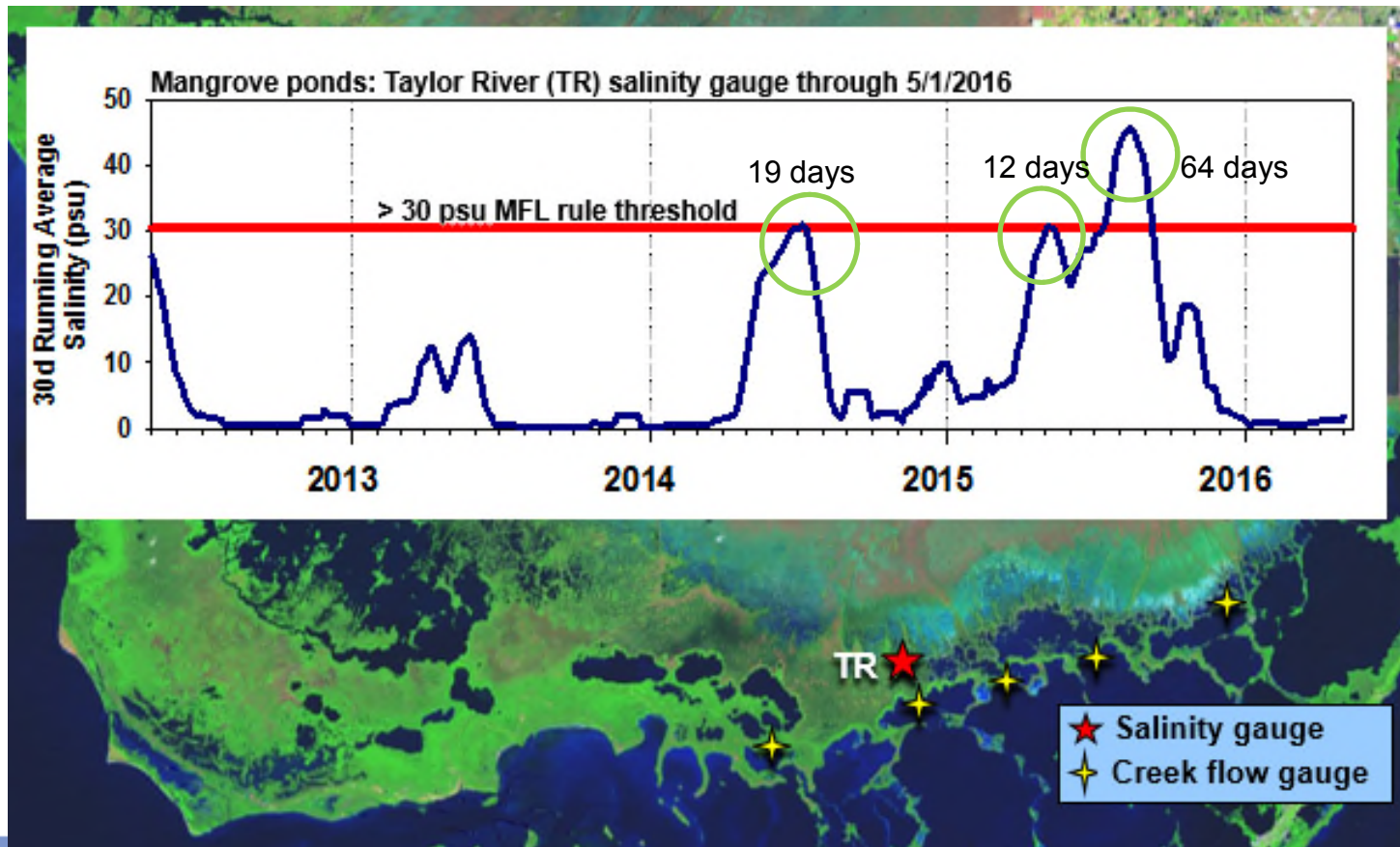
August 2015 - Flows to Northeastern Florida Bay Dropped Below 105,000 ac-ft

Lowest value recorded since the 5 creek flow gauges were installed in 1996 - 77,692 acre-feet



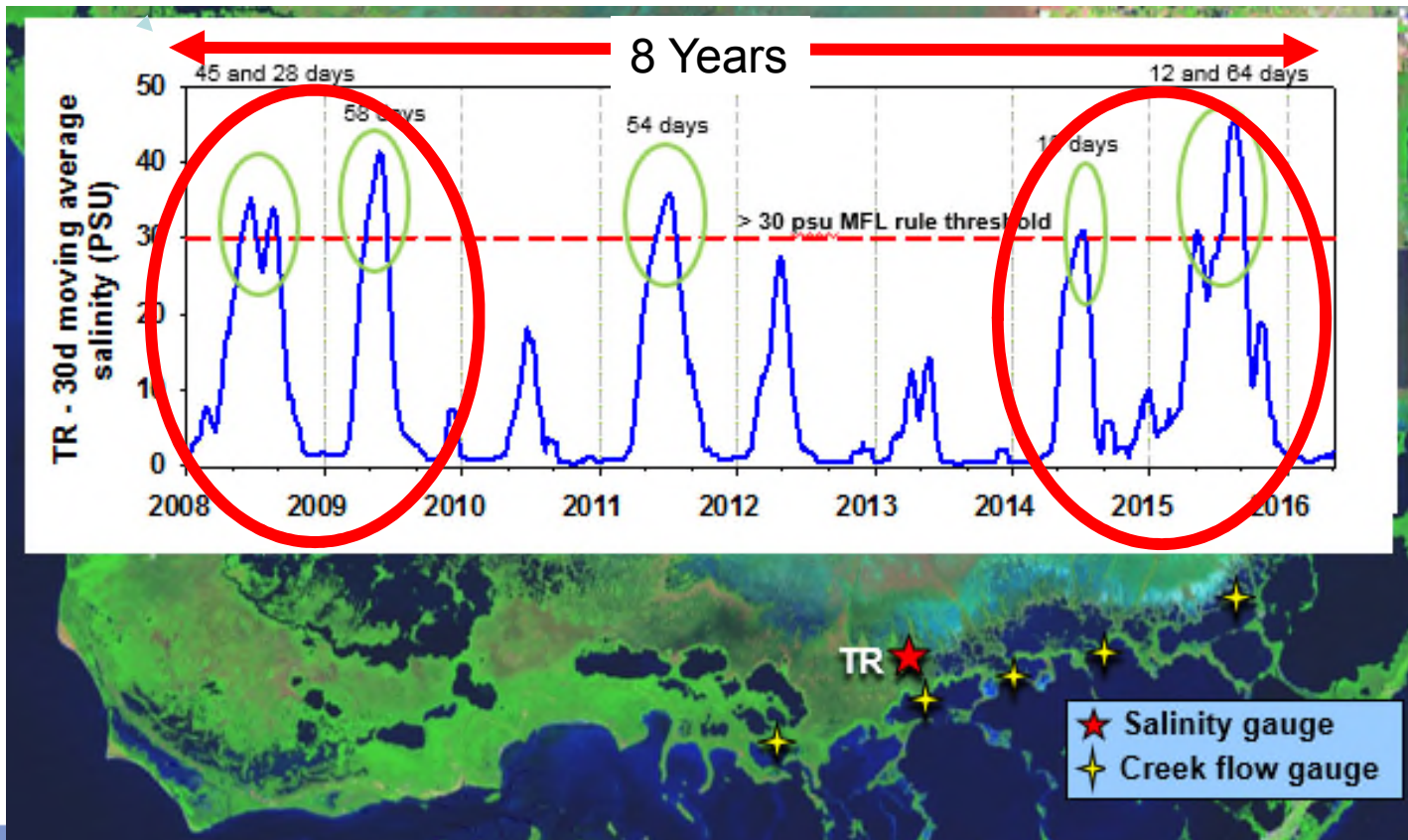
Consecutive MFL Exceedances in 2014 & 2015

An exceedance occurs when the 30-day running average salinity is greater than 30 psu

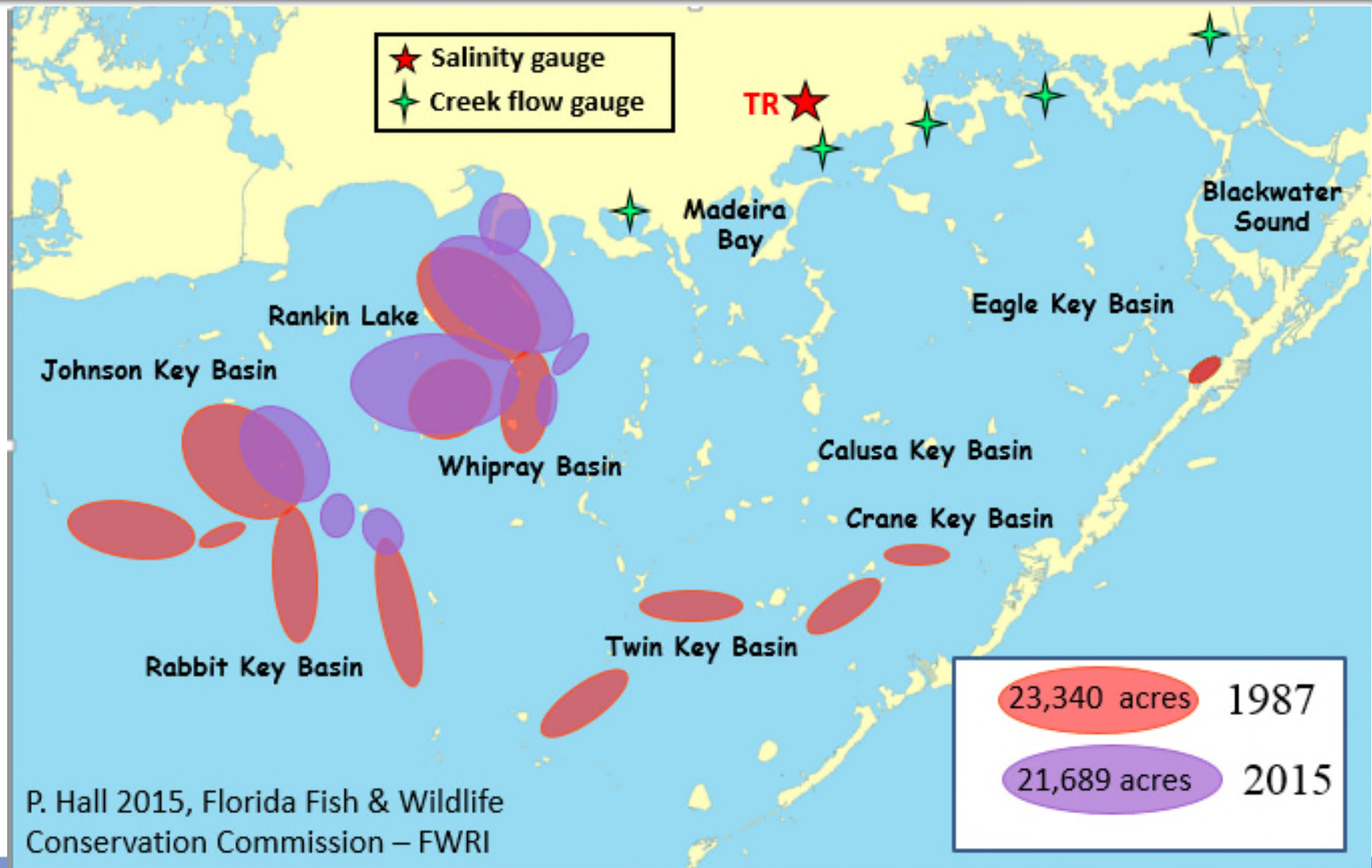


MFL Violation Due to Exceedances in 2008-2009 and 2014-2015

A violation occurs with exceedances during each of two consecutive years, more often than once in a ten-year period



Turtle Grass Die-Off Locations 1987-1990 vs 2016 Event



MFL Prevention Strategy Projects to Improve Flows

- Modifications to operations for improved management of freshwater discharges to the headwaters of Taylor Slough and southeast Everglades should consider MFL in coordination with:
 - **Modified Water Deliveries**
 - 1 mile Bridge Tamiami Trail - *March 2013*
 - 8.5 Square Mile Area – *Flood mitigation measures completed*
 - Conveyance and Seepage Control – *Substantially complete*
 - **C-111 South Dade – *75% Complete as of January 2016***
 - **C-111 Western Spreader Canal (Phase 1) –**
 - *Construction Completed in 2012*
 - *Operational Testing and Monitoring Completed June 2013*

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South Dade Initiative Complements Florida Bay Prevention Strategy

A number of feasible options could be pursued immediately:

Refine operations at key structures (0-6 months)

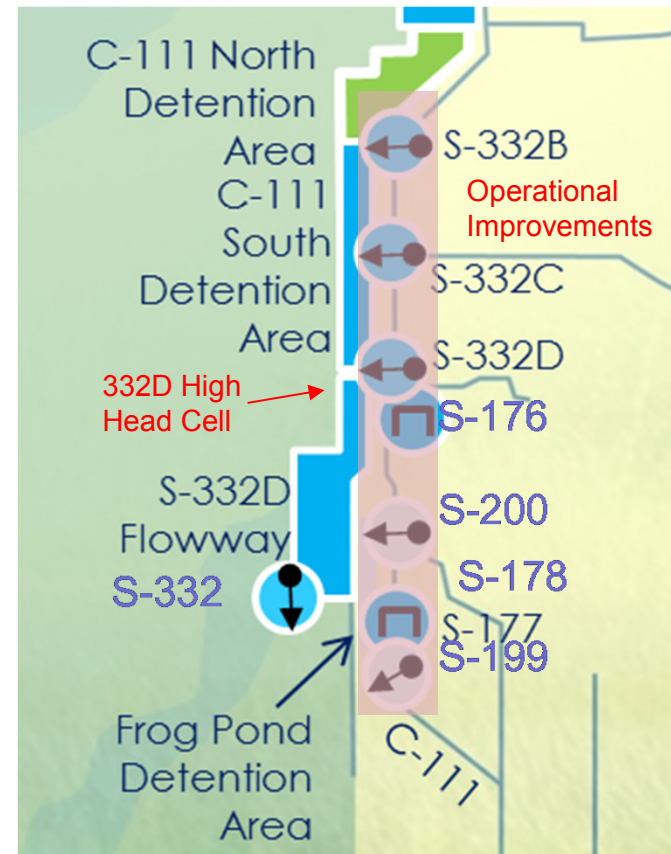
- Rainfall event-based criteria at S-177 & S-176

- Operate at lower end of range for S-332s

- Seasonal lowering of operations at S-199 & S-200

Modify High Head Cell at S-332D Flow-way to improve efficiency of water delivery to Taylor Slough and reduce seepage back toward developed areas (6-9 months)

These options are low cost or would only require staff time; they could be implemented by next dry season.



Other South Dade Initiatives Under Consideration

With Governing Board direction, additional options could be pursued, either as part of ongoing planning efforts or expedited by the District:

- Seasonal lowering of operating criteria at S-332s (9-12 months)

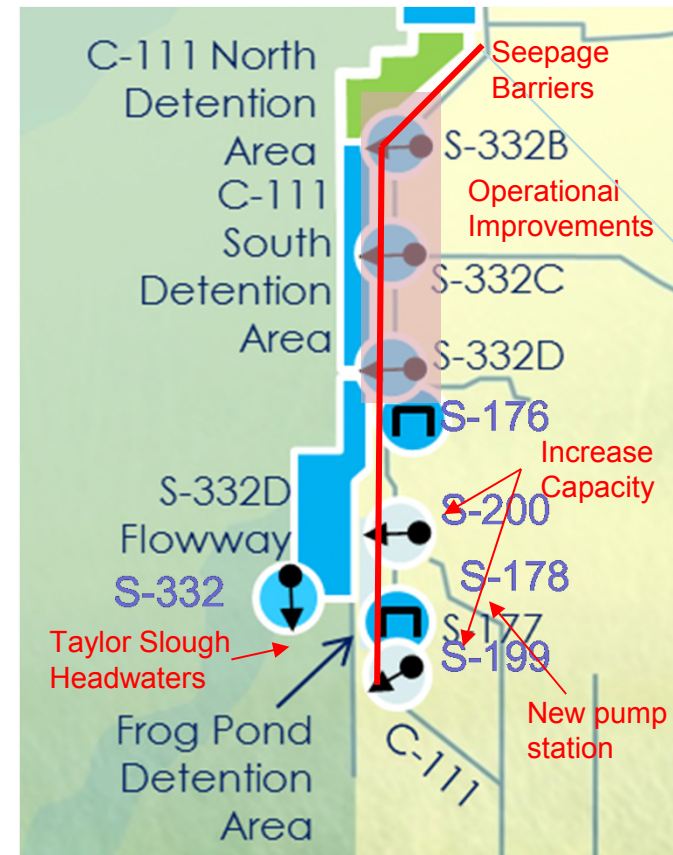
- Modify infrastructure in vicinity of Taylor Slough headwaters: \$1-5 million (1-3 years)

- Increase S-199 and S-200 pump capacity: \$4 million (1.5-2 years)

- Seepage collection canal and pump station near S-178: \$11 million (2-3 years)

- Seepage barrier – up to 15 miles in length: \$55-65 million (2-4 years)

Due to required planning, permitting, design, and construction efforts, these options would take time to implement.



Northeastern Florida Bay MFL

- “Violation” doesn’t trigger change from Prevention Strategy to Recovery Strategy
- Continued push to complete planned projects
- South Dade investigation to identify modification to operations for improved management of freshwater discharges to the headwaters of Taylor Slough and southeast Everglades
- Action items or projects resulting from ongoing effort can be incorporated in prevention strategy with next LEC Water Supply Update

WRAC Discussion

C-111 Basin – Sawgrass prairie habitat